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GROWTH AND DEVELOPMENT OF NEGRO INFANTS. IX, STUDIES ON WEIGHT, HEIGHT, PELVIC BREADTH, HEAD AND CHEST CIRCUMFERENCES DURING THE FIRST YEAR OF LIFE.

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THIS ARTICLE PRESENTS SIZE AND GROWTH VELOCITY DATA COLLECTED DURING A LONGITUDINAL STUDY OF 111 NORMAL, HEALTHY NEGRO INFANTS FROM LOWER-MIDDLE-CLASS FAMILIES. DATA WERE OBTAINED FROM BIRTH RECORDS AND MEASUREMENTS TAKEN DURING ROUTINE PHYSICAL EXAMINATIONS. WHEN THIS NEGRO SAMPLE WAS COMPARED WITH WHITE INFANTS IN SIMILAR STUDIES IT WAS FOUND THAT, IN GENERAL, PELVIC BREADTH AND HEAD AND CHEST CIRCUMFERENCE WERE SLIGHTLY LARGER AMONG WHITES. GROWTH VELOCITIES WERE ALSO HIGHER AMONG WHITES, AND GROWTH IN PELVIC BREADTH DECELERATED MORE RAPIDLY AMONG WHITES. HOWEVER, NO STATISTICALLY SIGNIFICANT DIFFERENCE BY RACE WAS FOUND. ON THE WHOLE, MALES OF BOTH RACES WERE LARGER THAN FEMALES, AND THEIR GROWTH RATE ALSO DECELERATED MORE RAPIDLY. THE FINDINGS ARE PRESENTED IN TABLES AND GRAPHS. THIS ARTICLE IS A REPRI FROM "PEDIATRICS," VOLUME 29, NUMBER 1, JANUARY 1962. (NH)

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GROWTH AND DEVELOPMENT OF NEGRO INFANTS

IX. Studies on Weight, Height, Pelvic Breadth, Head and Chest Circumferences during the First Year of Life

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THE SENIOR AUTHOR of this report participated in an earlier study of the growth in weight and length of Negro infants seen in private practice.[1] This report represents an extension of that project. In our well baby clinic, we studied growth not only in weight and length but also in pelvic breadth, head circumference and chest circumference. These additional dimensions of Negro infants have received little notice in the recent literature. In this report we present periodic statistics on growth increments and velocities as well as on size. Statistics on percentages of gain are included for weight and length.

METHOD OF STUDY

The Setting

This study was carried out between 1950 and 1956 in the well-baby clinic at Freedmen's Hospital. The clinic was established to serve mothers whose infants were delivered at this institution, to provide a training facility for medical students, and to collect data on growth and development. It is not operated primarily as a research center. Since this is a pay clinic, many of the subjects in this study might otherwise have been under the care of private physicians.

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The Sample

Forty-seven boys and 64 girls, or a total of 111 Negro infants, were included in this study. All were normal, healthy infants of lower middle class families. None had congenital defects or serious illnesses, and none was premature. The majority of these infants were fed breast milk and/or diluted evaporated milk with added carbohydrates. All were given vitamins at about 1 month and semi-solid foods at about 2 months of age. In general, the self-demand technique of feeding was encouraged.

Collection of Data

Except for pelvic breadth, complete birth data were available in obstetric records. All later measurements were taken in the course of routine physical examinations by three of the staff pediatricians. Every subject was followed through 52 weeks of age, but not all dimensions were measured at every examination. Priority was given to weight and length.

All measurements were taken in the recumbent position. Weight was measured on a basket balance. Length was taken on a measuring board. Head circumference was measured with a cloth tape encircling the most prominent part of the occiput and the frontal area just above the supraorbital ridges. Chest circumference was measured at mid-respiration with a cloth tape encircling the chest at the level of the xiphoid cartilage of the sternum. Pelvic breadth was taken with an obstetric caliper spanning the external margins of the iliac crests, including the overlying soft tissues.

Analysis of Data

For each dimension a strictly longitudinal sample was selected. Each sample was limited to subjects measured in that dimension at successive ages throughout the first year

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of life. Then the method of linear interpolation was used to approximate the size of each subject at each age in our two reported age series. For the large random errors of age-scattered measurement, this method substitutes small negative errors of approximation. This refinement results in sample uniformity from age to age and greatly smooths the growth curves.

Two sets of size statistics were derived. At 4-week intervals, individual size values were interpolated. The mean and standard deviation values were computed from them. Then the 13-week interval mean values were interpolated between means of the 4-week interval series. For weight and length individual size values were also interpolated at 13-week intervals, and their standard deviations were computed. For the other dimensions, no standard deviation values were computed at 13, 26 and 39 weeks.

The growth increment, growth velocity, and percentage of gain statistics were developed from the quarterly size statistics. The growth increment values were obtained by subtracting the pre-interval from the post-interval size values. For weight and length, the individual increment values were then converted to percentages of pre-interval size to produce the percentage of gain statistics. No percentage of gain statistics were derived for the other dimensions. Growth velocity is simply growth increment per unit age increment. By taking 13 weeks as our unit age increment, we made the quarterly growth velocities identical with the quarterly growth increments. Then to obtain comparable velocities from the semi-annual and annual growth increments, we multiplied them by 26/13 and 52/13 respectively.

RESULTS

The data on size are summarized at 4-week intervals in Table I and at quarterly intervals in Table II. The growth increment, growth velocity, and percentage of gain statistics are presented in Tables III, IV and V.

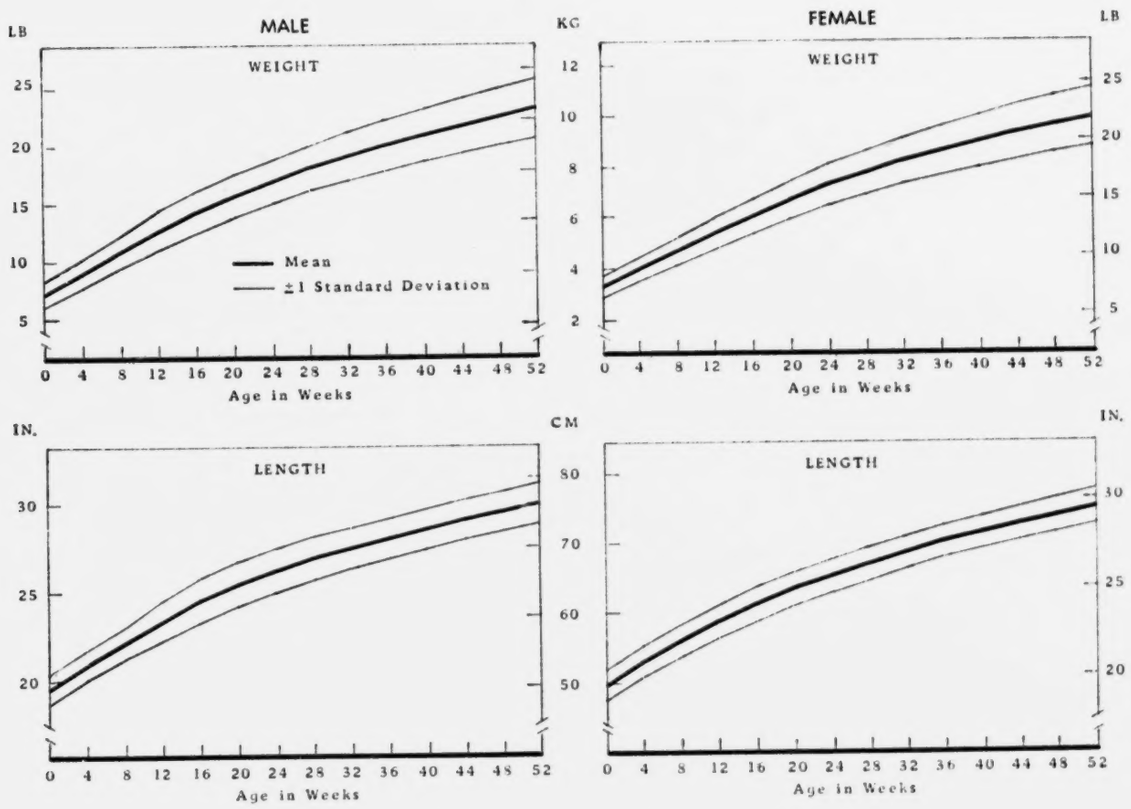

FIG. 1. Weight and length at 4-week intervals in the present series.

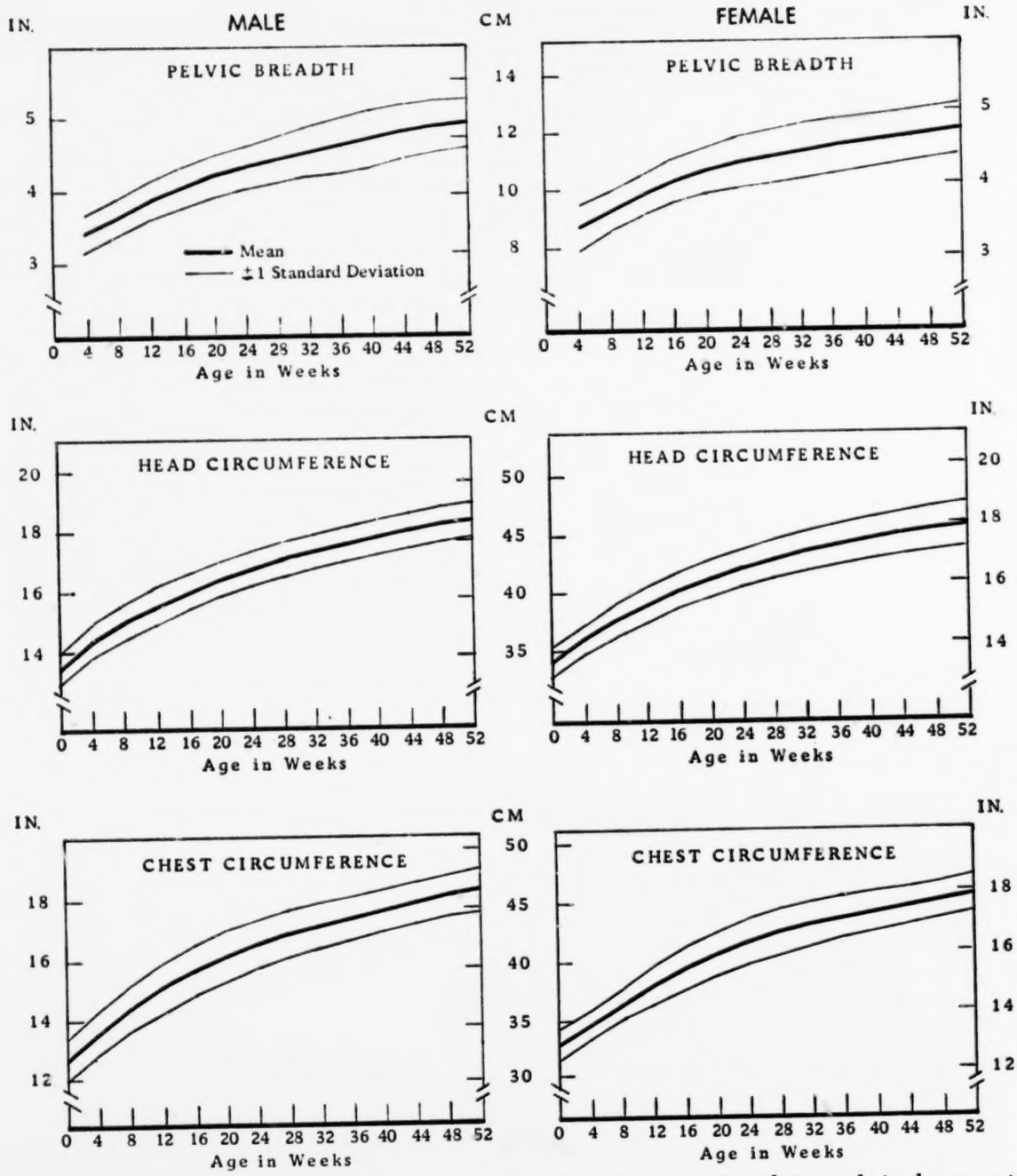

FIG. 2. Pelvic breadth, head circumference and chest circumference at 4-week intervals in the present series.

The size values in Table I are presented graphically in Figures 1 and 2. Figure 3 shows the quarterly mean growth velocities. The quarterly percentages of gains in weight and length are portrayed in Figure 7.

COMMENT

Comparison with Other Studies

In Figures 4 and 5 is presented a comparison of the growth curves from the present study with those representing three other studies. Our curves are plotted from Table II. The supporting data for the other curves are quoted in Tables VI, VII and VIII. Figure 4 shows the comparison with a study of white and Negro infants (1947-1952) in Philadelphia.[2] Figure 5 shows the comparison with the two other studies: one of Negro

TABLE I

SUMMARY OF DATA ON SIZE IN PRESENT SERIES AT 4-WEEK INTERVALS

Male			Female			Age (wk)	Male			Female		
N	Mean	S.D.	N	Mean	S.D.		N	Mean	S.D.	N	Mean	S.D.
Weight in Pounds							*Weight in Kilograms*					
47	7.10	1.02	64	7.22	0.97	0	47	3.22	0.46	64	3.28	0.44
47	8.89	1.12	64	8.76	1.11	4	47	4.04	0.51	64	3.98	0.50
47	10.80	1.33	64	10.36	1.16	8	47	4.90	0.60	64	4.70	0.53
47	12.64	1.62	64	11.92	1.29	12	47	5.74	0.74	64	5.41	0.59
47	14.20	1.73	64	13.38	1.42	16	47	6.45	0.79	64	6.08	0.65
47	15.56	1.81	64	14.70	1.56	20	47	7.06	0.82	64	6.67	0.71
47	16.77	1.86	64	15.95	1.76	24	47	7.61	0.84	64	7.24	0.80
47	17.89	1.92	64	17.02	1.89	28	47	8.12	0.87	64	7.73	0.86
47	18.86	2.03	64	17.97	1.97	32	47	8.56	0.92	64	8.16	0.89
47	19.80	2.08	64	18.87	2.07	36	47	8.99	0.94	64	8.57	0.94
47	20.67	2.18	64	19.71	2.17	40	47	9.38	0.99	64	8.95	0.99
47	21.49	2.27	64	20.46	2.27	44	47	9.76	1.03	64	9.29	1.03
47	22.23	2.39	64	21.18	2.38	48	47	10.09	1.09	64	9.62	1.08
47	22.91	2.47	64	21.87	2.48	52	47	10.40	1.12	64	9.93	1.13
Length in Inches							*Length in Centimeters*					
41	19.53	0.87	57	19.51	0.81	0	41	49.61	2.20	57	49.55	2.05
41	20.92	0.85	57	20.84	0.87	4	41	53.10	2.15	57	52.90	2.20
41	22.19	0.92	57	22.03	0.93	8	41	56.31	2.34	57	55.90	2.36
41	23.44	1.11	57	23.13	0.89	12	41	59.49	2.81	57	58.70	2.27
41	24.56	1.21	57	24.13	0.96	16	41	62.33	3.06	57	61.24	2.44
41	25.48	1.21	57	24.98	0.89	20	41	64.67	3.07	57	63.40	2.27
41	26.28	1.21	57	25.75	0.91	24	41	66.69	3.06	57	65.36	2.30
41	26.94	1.19	57	26.40	0.91	28	41	68.38	3.02	57	67.01	2.32
41	27.51	1.10	57	27.01	0.84	32	41	69.82	2.78	57	68.55	2.13
41	28.06	1.10	57	27.56	0.88	36	41	71.22	2.79	57	69.95	2.23
41	28.57	1.08	57	28.10	0.87	40	41	72.51	2.75	57	71.38	2.21
41	29.05	1.07	57	28.61	0.89	44	41	73.74	2.72	57	72.61	2.27
41	29.51	1.10	57	29.08	0.92	48	41	74.90	2.78	57	73.80	2.34
41	29.96	1.12	57	29.51	0.97	52	41	76.10	2.83	57	74.96	2.47
Pelvic Breadth in Inches							*Pelvic Breadth in Centimeters*					
23	3.45	0.26	26	3.42	0.30	4	23	8.75	0.65	26	8.76	0.76
23	3.67	0.24	26	3.64	0.27	8	23	9.32	0.60	26	9.24	0.68
23	3.89	0.26	26	3.86	0.28	12	23	9.88	0.66	26	9.80	0.72
23	4.07	0.28	26	4.07	0.30	16	23	10.34	0.71	26	10.32	0.76
23	4.21	0.29	26	4.19	0.32	20	23	10.69	0.73	26	10.63	0.80
23	4.33	0.30	26	4.28	0.35	24	23	10.98	0.77	26	10.87	0.89
23	4.43	0.32	26	4.37	0.37	28	23	11.24	0.81	26	11.09	0.95
23	4.54	0.35	26	4.44	0.38	32	23	11.51	0.88	26	11.28	0.96
23	4.63	0.38	26	4.52	0.37	36	23	11.74	0.96	26	11.47	0.94
23	4.71	0.39	26	4.57	0.37	40	23	11.96	1.00	26	11.61	0.93
23	4.80	0.37	26	4.63	0.35	44	23	12.17	0.93	26	11.75	0.89
23	4.87	0.35	26	4.69	0.35	48	23	12.37	0.89	26	11.89	0.88
23	4.95	0.34	26	4.73	0.34	52	23	12.56	0.85	26	12.01	0.87
Head Circumference in Inches							*Head Circumference in Centimeters*					
38	13.43	0.56	51	13.37	0.49	0	38	34.09	1.43	51	33.93	1.24
38	14.33	0.60	51	14.15	0.49	4	38	36.36	1.15	51	35.92	1.24
38	14.99	0.61	51	14.76	0.53	8	38	38.05	1.55	51	37.47	1.35
38	15.53	0.63	51	15.33	0.58	12	38	39.41	1.60	51	38.90	1.46
38	16.01	0.61	51	15.80	0.60	16	38	40.64	1.55	51	40.10	1.53
38	16.44	0.56	51	16.21	0.62	20	38	41.73	1.43	51	41.13	1.58
38	16.79	0.56	51	16.56	0.64	24	38	42.62	1.42	51	42.04	1.63
38	17.11	0.56	51	16.87	0.66	28	38	43.42	1.41	51	42.81	1.68
38	17.38	0.56	51	17.14	0.66	32	38	44.12	1.43	51	43.51	1.68
38	17.62	0.57	51	17.36	0.69	36	38	44.72	1.45	51	44.06	1.76
38	17.84	0.59	51	17.56	0.71	40	38	45.27	1.50	51	44.56	1.81
38	18.03	0.59	51	17.73	0.73	44	38	45.76	1.49	51	45.01	1.85
38	18.22	0.60	51	17.90	0.76	48	38	46.25	1.52	51	45.43	1.92
38	18.40	0.60	51	18.05	0.87	52	38	46.69	1.53	51	45.81	1.97

TABLE I (*Continued*)

Male			Female			Age (wk)	Male			Female		
N	Mean	S.D.	N	Mean	S.D.		N	Mean	S.D.	N	Mean	S.D.
Chest Circumference in Inches							Chest Circumference in Centimeters					
25	12.63	0.71	30	12.88	0.58	0	25	32.06	1.79	30	32.68	1.46
25	13.59	0.70	30	13.53	0.45	4	25	34.48	1.77	30	34.35	1.14
25	14.34	0.78	30	14.21	0.50	8	25	36.40	1.97	30	36.06	1.26
25	15.06	0.88	30	14.89	0.65	12	25	38.21	2.22	30	37.79	1.66
25	15.64	0.88	30	15.43	0.76	16	25	39.69	2.22	30	39.17	1.93
25	16.11	0.85	30	15.92	0.73	20	25	40.88	2.15	30	40.41	1.84
25	16.51	0.81	30	16.34	0.79	24	25	41.90	2.05	30	41.48	2.00
25	16.86	0.79	30	16.85	0.80	28	25	42.78	2.01	30	42.26	2.03
25	17.15	0.76	30	16.90	0.75	32	25	43.52	1.92	30	42.88	1.90
25	17.40	0.72	30	17.12	0.70	36	25	44.17	1.83	30	43.45	1.77
25	17.64	0.71	30	17.34	0.66	40	25	44.76	1.79	30	44.01	1.67
25	17.86	0.69	30	17.53	0.62	44	25	45.32	1.76	30	44.50	1.57
25	18.08	0.70	30	17.72	0.59	48	25	45.89	1.78	30	44.98	1.50
25	18.28	0.71	30	17.91	0.59	52	25	46.40	1.81	30	45.45	1.50

infants (1940-1947) in Washington, D.C.,[1] and one of white infants (1943) in Boston.[3] In Figures 6 and 8 are compared the growth velocities and percentages of gains in our present study with those for the white and Negro infants of the Philadelphia study. Table IX presents the growth velocities that we computed from increment data reported by Kasius *et al.*[2] Their data on percentage of gain are quoted in Table X.

Weight

The birth weights for all three Negro samples were lower than for either of the two white samples. This is in keeping with most comparative reports in the literature. Racial and prenatal factors may explain this difference. During the first year of life, however, the weight curves for the two races are strikingly similar, as shown in Figures 4 and 5. The birth weights for both sexes in the present study were slightly lower than those reported for the other two Negro samples, but by 1 year of age the infants in our study were the heaviest of the Negro infants. In general, the males of both races were heavier than the females throughout the year. But at birth, in our study, the girls weighed slightly more than the boys. This atypical finding is undoubtedly due to sampling bias.

For both races the annual mean velocity of growth in weight was higher in the males than in the females. Among the three samples compared, the annual velocities in our study were the highest, for both males and females, and those for the Philadelphia Negro sample were the lowest. The greatest difference, 0.29 lb/13 weeks, was between females in our group and those of the other Negro sample. All of these differences are very small and inconsistent by race. Figure 6 shows that during the first quarter ours were the lowest velocities for both sexes, and there were practically no differences between the other two samples for either male or female. During the second quarter the velocities for males in the two Negro samples were about the same, falling below the velocity for males in the white sample. The three velocities for females were almost identical, with ours lagging very slightly. Then during the last half year, the velocities for the two Philadelphia samples remained much alike but fell slightly below ours for both sexes.

Growth in weight was found to decelerate more rapidly for males than for females in both races. For both sexes, the deceleration was most rapid for the Philadelphia Negro sample and least rapid for ours, showing no consistent difference by race.

Length

At birth the males in our group were shorter than those in any comparison sample, but our females were longer than the

TABLE II

SUMMARY OF DATA ON SIZE IN PRESENT SERIES AT 13-WEEK INTERVALS

Male			*Female*				*Male*			*Female*		
N	*Mean*	*S.D.*	*N*	*Mean*	*S.D.*	*Age (wk)*	*N*	*Mean*	*S.D.*	*N*	*Mean*	*S.D*
Weight in Pounds							*Weight in Kilograms*					
47	7.10	1.02	64	7.22	0.97	0	47	3.22	0.46	64	3.28	0.44
47	13.03	1.63	64	12.29	1.31	13	47	5.91	0.74	64	5.58	0.59
47	17.33	1.86	64	16.49	1.10	26	47	7.86	0.85	64	7.48	0.91
47	20.46	2.03	64	19.50	2.15	39	47	9.29	0.95	64	8.85	0.97
47	22.91	2.47	64	21.87	2.48	52	47	10.39	1.12	64	9.92	1.13
Length in Inches							*Length in Centimeters*					
41	19.53	0.87	57	19.31	0.81	0	41	49.61	2.21	57	49.55	2.05
41	23.70	1.11	57	23.36	0.90	13	41	60.20	2.81	57	59.34	2.05
41	26.59	1.19	57	26.06	0.90	26	41	67.53	3.03	57	66.19	2.30
41	28.42	1.08	57	27.95	0.86	39	41	72.19	2.75	57	70.98	2.47
41	29.96	1.11	57	29.51	0.97	52	41	76.10	2.83	57	74.96	2.47
Pelvic Breadth in Inches							*Pelvic Breadth in Centimeters*					
23	3.45	0.26	26	3.41	0.30	4	23	8.75	0.65	26	8.67	0.76
23	3.94	..	26	3.91	..	13	23	10.00	..	26	9.93	..
23	4.38	..	26	4.32	..	26	23	11.11	..	26	10.98	..
23	4.69	..	26	4.56	..	39	23	11.91	..	26	11.58	..
23	4.95	0.34	26	4.73	0.34	52	23	12.56	0.87	26	12.01	0.85
Head Circumference in Inches							*Head Circumference in Centimeters*					
38	13.43	0.56	51	13.37	0.49	0	38	34.09	1.43	51	33.93	1.24
38	15.65	..	51	15.44	..	13	38	39.72	..	51	39.20	..
38	16.95	..	51	16.73	..	26	38	43.02	..	51	42.53	..
38	17.79	..	51	17.51	..	39	38	45.13	..	51	44.44	..
38	18.40	0.60	51	18.05	0.78	52	38	46.69	1.53	51	45.81	1.97
Chest Circumference in Inches							*Chest Circumference in Centimeters*					
25	12.63	0.71	30	12.88	0.58	0	25	32.06	1.79	30	32.68	1.46
25	15.21	..	30	15.03	..	13	25	38.58	..	30	38.14	..
25	16.69	..	30	16.50	..	26	25	42.34	..	30	41.87	..
25	17.58	..	30	17.29	..	39	25	44.61	..	30	43.87	..
25	18.28	0.71	30	17.91	0.59	52	25	46.40	1.81	30	45.45	1.50

Philadelphia Negro females. For both sexes the birth lengths reported by Scott *et al.*[1] were the greatest, but by 1 year of age the Philadelphia Negro infants had attained the greatest length. With minor variations between samples from age to age, the length curves are remarkably similar (Figs. 4 and 5).

Again for both races, the annual mean velocity of growth was greater in the males than in the females. It was greater for the females of our group than for those of either comparison sample; and it scarcely differed at all between the males of the three samples. During the first quarter the velocities in our sample, for both sexes, were the lowest among the three samples, but during the second quarter they were the highest. Then during the second half year, the velocities of both comparison groups exceeded ours. The velocities for the other Negro sample exceeded those for the white sample during the first quarter, however, and matched them closely during the second quarter. The velocities for males for the two samples were nearly identical during the second half year, while the velocity for females was higher for the Negro sample. There appears to be no consistent difference by race.

Again, growth was found to decelerate

TABLE III

QUARTERLY, SEMI-ANNUAL AND ANNUAL GROWTH INCREMENTS FOR PRESENT SERIES

Male			*Female*			*Intervals (wk)*	*Male*			*Female*		
N	*Mean*	*S.D.*	*N*	*Mean*	*S.D.*		*N*	*Mean*	*S.D.*	*N*	*Mean*	*S.D.*
Weight in Pounds							*Weight in Kilograms*					
47	5.93	1.48	64	5.07	1.00	0–13	47	2.69	0.67	64	2.30	0.45
47	4.30	0.92	64	4.20	1.02	13–26	47	1.95	0.42	64	1.91	0.46
47	3.13	0.73	64	3.01	0.80	26–39	47	1.44	0.34	64	1.37	0.36
47	2.45	1.01	64	2.36	0.81	39–52	47	1.10	0.47	64	1.07	0.37
47	10.23	1.85	64	9.27	1.62	0–26	47	4.64	0.84	64	4.20	0.73
47	5.58	1.35	64	5.38	1.10	26–52	47	2.45	0.69	64	2.44	0.50
47	15.81	2.41	64	14.65	2.33	0–52	47	7.17	1.09	64	6.65	1.06
Length in Inches							*Length in Centimeters*					
41	4.17	0.92	57	3.85	0.74	0–13	41	10.59	2.34	57	9.79	1.87
41	2.89	0.53	57	2.70	0.62	13–26	41	7.33	1.36	57	6.85	1.57
41	1.83	0.53	57	1.89	0.47	26–39	41	4.66	1.34	57	4.80	1.20
41	1.54	0.51	57	1.57	0.38	39–52	41	3.91	1.30	57	3.98	0.96
41	7.05	1.01	57	6.55	0.91	0–26	41	17.92	2.57	57	16.63	2.30
41	3.37	0.89	57	3.45	0.61	26–52	41	8.57	2.26	57	8.77	1.56
41	10.43	1.12	57	10.00	1.03	0–52	41	26.49	2.84	57	25.41	2.60
Pelvic Breadth in Inches							*Pelvic Breadth in Centimeters*					
23	0.71	..	26	0.71	..	0–13*	23	1.80	..	26	1.80	..
23	0.44	..	26	0.41	..	13–26	23	1.11	..	26	1.05	..
23	0.31	..	26	0.24	..	26–39	23	0.80	..	26	0.60	..
23	0.26	..	26	0.17	..	39–52	23	0.65	..	26	0.43	..
23	1.15	..	26	1.12	..	0–26*	23	2.91	..	26	2.85	..
23	0.57	..	26	0.41	..	26–52	23	1.45	..	26	1.03	..
23	1.72	..	26	1.53	..	0–52*	23	4.36	..	26	3.88	..
Head Circumference in Inches							*Head Circumference in Centimeters*					
38	2.22	..	51	2.08	..	0–13	38	5.63	..	51	5.27	..
38	1.30	..	51	1.31	..	13–26	38	3.30	..	51	3.33	..
38	0.83	..	51	0.75	..	26–39	38	2.11	..	51	1.91	..
38	0.61	..	51	0.54	..	39–52	38	1.56	..	51	1.37	..
38	3.48	..	51	3.39	..	0–26	38	8.93	..	51	8.60	..
38	1.45	..	51	1.29	..	26–52	38	3.67	..	51	3.28	..
38	4.96	..	51	4.68	..	0–52	38	12.60	..	51	11.88	..
Chest Circumference in Inches							*Chest Circumference in Centimeters*					
25	2.57	..	30	2.15	..	0–13	25	6.52	..	30	5.46	..
25	1.48	..	30	1.47	..	13–26	25	3.76	..	30	3.73	..
25	0.89	..	30	0.79	..	26–39	25	2.27	..	30	2.00	..
25	0.71	..	30	0.62	..	39–52	25	1.79	..	30	1.58	..
25	4.05	..	30	3.62	..	0–26	25	10.28	..	30	9.19	..
25	1.60	..	30	1.41	..	26–52	25	4.06	..	30	3.58	..
25	5.65	..	30	5.03	..	0–52	25	14.34	..	30	12.77	..

* Extrapolated birth values were used in computing these pelvic increments.

more rapidly for males than for females in both races. Deceleration was most rapid for the Philadelphia Negro sample and least rapid for ours, showing no consistent difference by race.

Percentage of Gain in Weight and Length

For weight and length only, we compared the mean percentages of gains with those reported in the Philadelphia study. Figure 8 shows this comparison and reveals no consistent difference either by race or by locale.

Pelvic Breadth

For both sexes at all study ages, the mean pelvic breadth was found to be greater for

TABLE IV

QUARTERLY, SEMI-ANNUAL AND ANNUAL GROWTH VELOCITIES FOR PRESENT SERIES

Male		*Female*		*Intervals (wk)*	*Male*		*Female*	
N	*Mean*	*N*	*Mean*		*N*	*Mean*	*N*	*Mean*
Weight, lb/13 wk					*Weight, kg/13 wk*			
47	5.93	64	5.07	0–13	47	2.69	64	2.30
47	4.30	64	4.20	13–26	47	1.95	64	1.91
47	3.13	64	3.01	26–39	47	1.44	64	1.37
47	2.45	64	2.36	39–52	47	1.10	64	1.07
47	5.12	64	4.63	0–26	47	2.32	64	2.10
47	2.79	64	2.69	26–52	47	1.23	64	1.22
47	3.96	64	3.66	0–52	47	1.79	64	1.66
Length, in./13 wk					*Length, cm/13 wk*			
41	4.17	57	3.85	0–13	41	10.59	57	9.79
41	2.89	57	2.70	13–26	41	7.33	57	6.85
41	1.83	57	1.89	26–39	41	4.66	57	4.80
41	1.54	57	1.57	39–52	41	3.91	57	3.98
41	3.52	57	3.27	0–26	41	8.96	57	8.32
41	1.68	57	1.73	26–52	41	4.29	57	4.38
41	2.61	57	2.50	0–52	41	6.62	57	6.36
Pelvic Breadth, in./13 wk					*Pelvic Breadth, cm/13 wk*			
23	0.71	26	0.71	0–13*	23	1.80	26	1.80
23	0.44	26	0.41	13–26	23	1.11	26	1.05
23	0.31	26	0.24	26–39	23	0.80	26	0.60
23	0.26	26	0.17	39–52	23	0.65	26	0.43
23	0.58	26	0.56	0–26*	23	1.46	26	1.43
23	0.29	26	0.21	26–52	23	0.72	26	0.52
23	0.43	26	0.38	0–52*	23	1.09	26	0.97
Head Circumference, in./13 wk					*Head Circumference, cm/13 wk*			
38	2.22	51	2.08	0–13	38	5.63	51	5.27
38	1.30	51	1.31	13–26	38	3.30	51	3.33
38	0.83	51	0.75	26–39	38	2.11	51	1.91
38	0.61	51	0.54	39–52	38	1.56	51	1.37
38	1.74	51	1.69	0–26	38	4.47	51	4.30
38	0.73	51	0.65	26–52	38	1.84	51	1.64
38	1.28	51	1.17	0–52	38	3.15	51	2.97
Chest Circumference, in./13 wk					*Chest Circumference, cm/13 wk*			
25	2.57	30	2.15	0–13	25	6.52	30	5.46
25	1.48	30	1.47	13–26	25	3.76	30	3.73
25	0.89	30	0.79	26–39	25	2.27	30	2.00
25	0.71	30	0.62	39–52	25	1.79	30	1.58
25	2.03	30	1.81	0–26	25	5.14	30	4.60
25	0.80	30	0.71	26–52	25	2.03	30	1.79
25	1.41	30	1.51	0–52	25	3.59	30	3.19

* Extrapolated birth values were used in computing these pelvic growth velocities.

the white than for the Negro samples compared. This observation was also reported by Meredith.[4] In general, the males had wider pelves than the females in both racial groups. This would seem to be an anatomic variation between the sexes peculiar to the age period under consideration. We report no birth measurements for this dimension. Otherwise, for both sexes our growth curves correspond very closely with those representing the Philadelphia Negro sample. This is especially true for the females (Fig. 4). Although at 3 months of age the males of that sample had wider pelves than the males in our sample, the reverse was found at 1 year of age.

In this dimension, also, the annual mean velocity of growth was greater in the males

TABLE V

QUARTERLY, SEMI-ANNUAL AND ANNUAL PERCENTAGE GAINS, IN WEIGHT AND LENGTH ONLY, FOR PRESENT SERIES

Male			*Female*			*Intervals (wk)*	*Male*			*Female*		
N	*Mean*	*S.D.*	*N*	*Mean*	*S.D.*		*N*	*Mean*	*S.D.*	*N*	*Mean*	*S.D.*
Weight							*Length*					
47	85.6	24.8	64	71.6	14.5	0–13	41	21.4	5.1	57	19.5	5.8
47	33.5	7.8	64	34.4	6.2	13–26	41	12.2	2.4	57	11.6	3.0
47	18.2	4.5	64	18.4	4.7	26–39	41	7.0	2.2	57	7.3	1.9
47	12.0	5.1	64	12.1	4.5	39–52	41	5.4	1.8	57	5.6	1.3
47	147.4	37.2	64	130.3	30.0	0–26	41	36.2	5.7	57	33.7	2.2
47	32.4	8.5	64	32.8	9.2	26–52	41	11.3	2.9	57	13.3	2.5
47	223.3	51.4	64	206.0	43.3	0–52	41	53.6	7.0	57	51.5	6.6

than in the females of both races. It was lower for both Negro samples than for the white sample, and lower for our sample than for the other Negro sample. Here, for the first time, the difference by race is greater than the difference by sex. The first quarter comparison in Figure 6 shows much lower velocities for males and females for our sample than for the other two. This is because our "first quarter" velocities do not

TABLE VI

DATA ON SIZE OF WHITE AND NEGRO INFANTS IN PHILADELPHIA STUDY IN 1947–1952[2]

White Infants				*Age (mo)*	*Negro Infants*			
Male		*Female*			*Male*		*Female*	
N	*Mean*	*N*	*Mean*		*N*	*Mean*	*N*	*Mean*
Weight in Pounds					*Weight in Pounds*			
569	7.53	468	7.26	0	185	7.38	169	7.15
265	13.45	248	12.42	3	151	13.49	130	12.48
238	18.05	212	16.72	6	141	17.67	120	16.46
134	23.47	122	21.68	12	92	22.76	84	21.42
Length in Centimeters					*Length in Centimeters*			
513	50.30	403	49.61	0	162	50.12	149	49.40
264	61.03	247	59.88	3	152	61.19	129	59.98
234	67.89	212	66.26	6	138	67.90	119	66.14
131	76.75	124	74.83	12	91	76.87	82	75.60
Pelvic Breadth in Centimeters					*Pelvic Breadth in Centimeters*			
387	8.18	318	7.96	0	135	7.85	122	7.72
229	10.72	199	10.32	3	128	10.27	108	9.90
213	11.87	172	11.42	6	121	11.30	103	10.90
122	13.06	110	12.66	12	79	12.25	71	11.97
Head circumference in Centimeters					*Head Circumference in Centimeters*			
506	34.56	406	33.79	0	161	34.44	149	33.78
265	40.55	246	39.60	3	151	40.94	129	39.97
234	43.69	212	42.49	6	138	44.08	118	42.97
131	46.94	124	45.49	12	92	47.09	82	46.17
Chest Circumference in Centimeters					*Chest Circumference in Centimeters*			
508	32.60	406	32.25	0	161	32.01	148	31.89
265	41.01	247	39.78	3	151	40.67	129	39.45
232	44.73	211	43.50	6	137	44.14	115	42.93
130	48.71	121	46.86	12	91	47.51	82	46.21

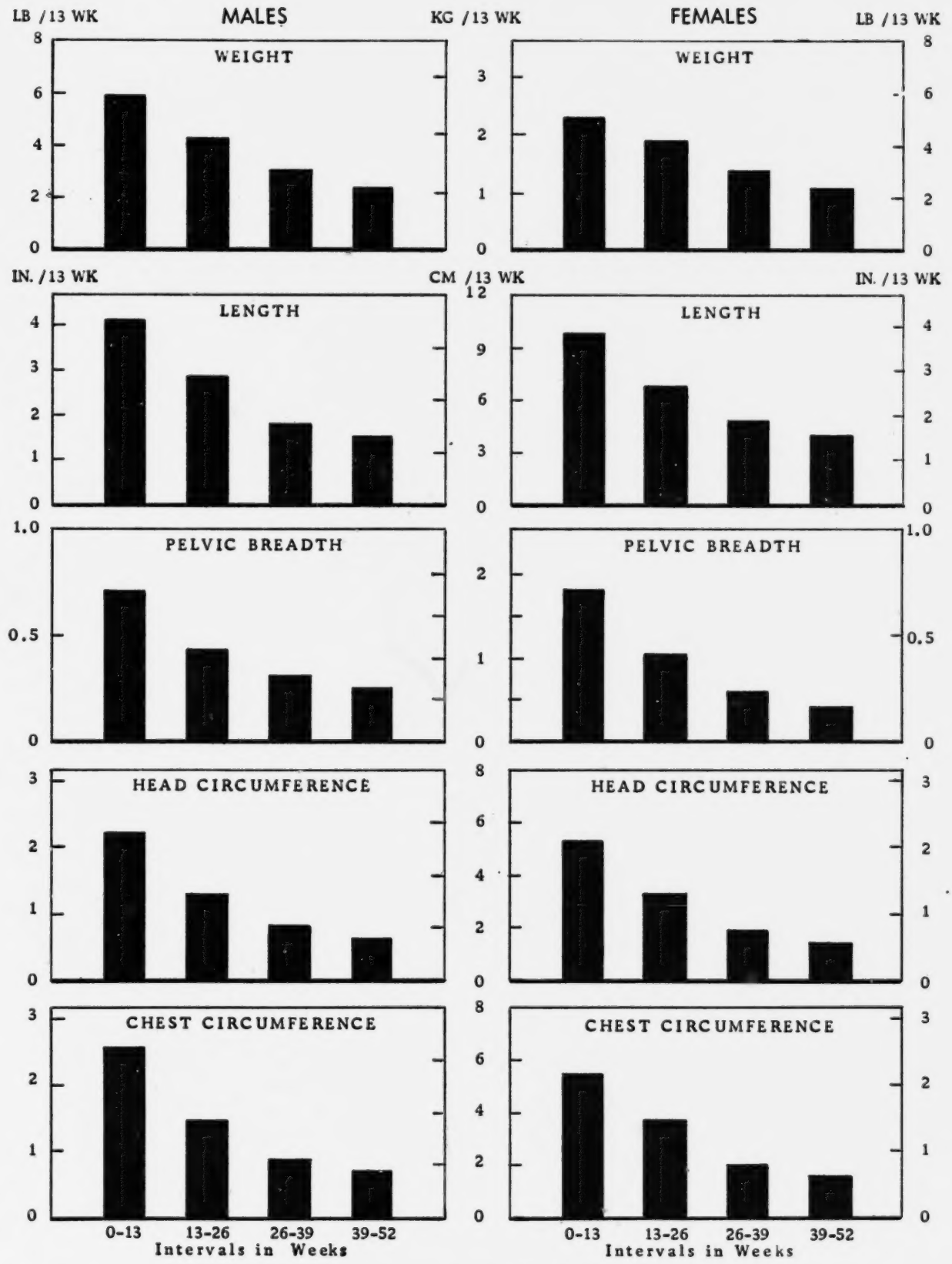

FIG. 3. Quarterly mean growth velocities for the present series.

reflect the first month of life, when growth is characteristically most rapid. The second-quarter velocities for both sexes in our sample were practically identical to those for the other Negro sample, and during the second half year the velocities in our sample exceeded those for both comparison samples. The velocities for males in the white

TABLE VII

DATA ON WEIGHT AND LENGTH OF NEGRO INFANTS IN WASHINGTON STUDY IN 1940–1947[1]

Weight in Pounds				*Age (mo)*	*Length in Centimeters*			
Male		*Female*			*Male*		*Female*	
N	*Mean*	*N*	*Mean*		*N*	*Mean*	*N*	*Mean*
320	7.66	318	7.20	0–1	171	53.59	162	53.09
307	12.89	306	12.06	3	211	59.94	208	59.18
297	17.52	303	16.34	6	215	67.31	219	66.04
298	21.01	282	19.29	9	219	71.88	202	70.87
292	22.59	261	21.33	12	219	75.69	205	74.93

sample were higher in all three periods than those for the Philadelphia Negro sample. The velocities were higher for females in the white sample during the first two quarters and about equal for the white and Negro Philadelphia samples during the second half year.

Growth decelerated more rapidly for the white sample and more rapidly for males than for females in the Philadelphia infants. For our sample, however, deceleration was slightly more rapid in the females. Perhaps this, too, is because our "first-quarter" velocities do not reflect the first month of life. The difference in deceleration is greater by sex than by race in the Philadelphia study.

Head Circumference

In view of the preceding comparisons of birth dimensions of Negro and white infants, smaller head circumferences in Negroes would be the expected finding. It was confirmed, in general, but the birth mean for females in our group was 0.15 cm larger than that for the Philadelphia white females. At all other comparison ages the Philadelphia Negro infants of both sexes had the largest head circumferences, while our sample showed the smallest among the males of the five samples under comparison.

TABLE VIII

DATA ON SIZE OF WHITE INFANTS IN BOSTON STUDY IN 1943[3]

Weight in Pounds				*Age (mo)*	*Length in Centimeters*			
Male		*Female*			*Male*		*Female*	
N	*Mean*	*N*	*Mean*		*N*	*Mean*	*N*	*Mean*
136	7.6	145	7.5	0	88	50.6	99	50.1
125	12.8	129	12.4	3	121	60.4	122	59.4
118	17.2	134	17.3	6	110	67.0	131	65.7
119	20.5	122	19.6	9	115	71.5	117	70.1
117	22.6	127	21.8	12	113	75.5	121	74.5
Pelvic Breadth in Centimeters					*Head Circumference in Centimeters*			
96	8.1	89	7.8	0	99	35.3	110	34.7
48	10.6	55	10.5	3	125	40.8	121	40.0
51	11.8	62	11.6	6	117	44.0	131	42.9
54	12.4	57	12.1	9	115	45.8	121	44.7
46	12.8	64	12.6	12	113	47.1	121	45.9
					Chest Circumference in Centimeters			
				0	98	33.2	111	32.9
				3	115	40.6	120	39.8
				6	113	44.0	130	43.2
				9	114	46.5	120	45.6
				12	109	47.9	123	47.2

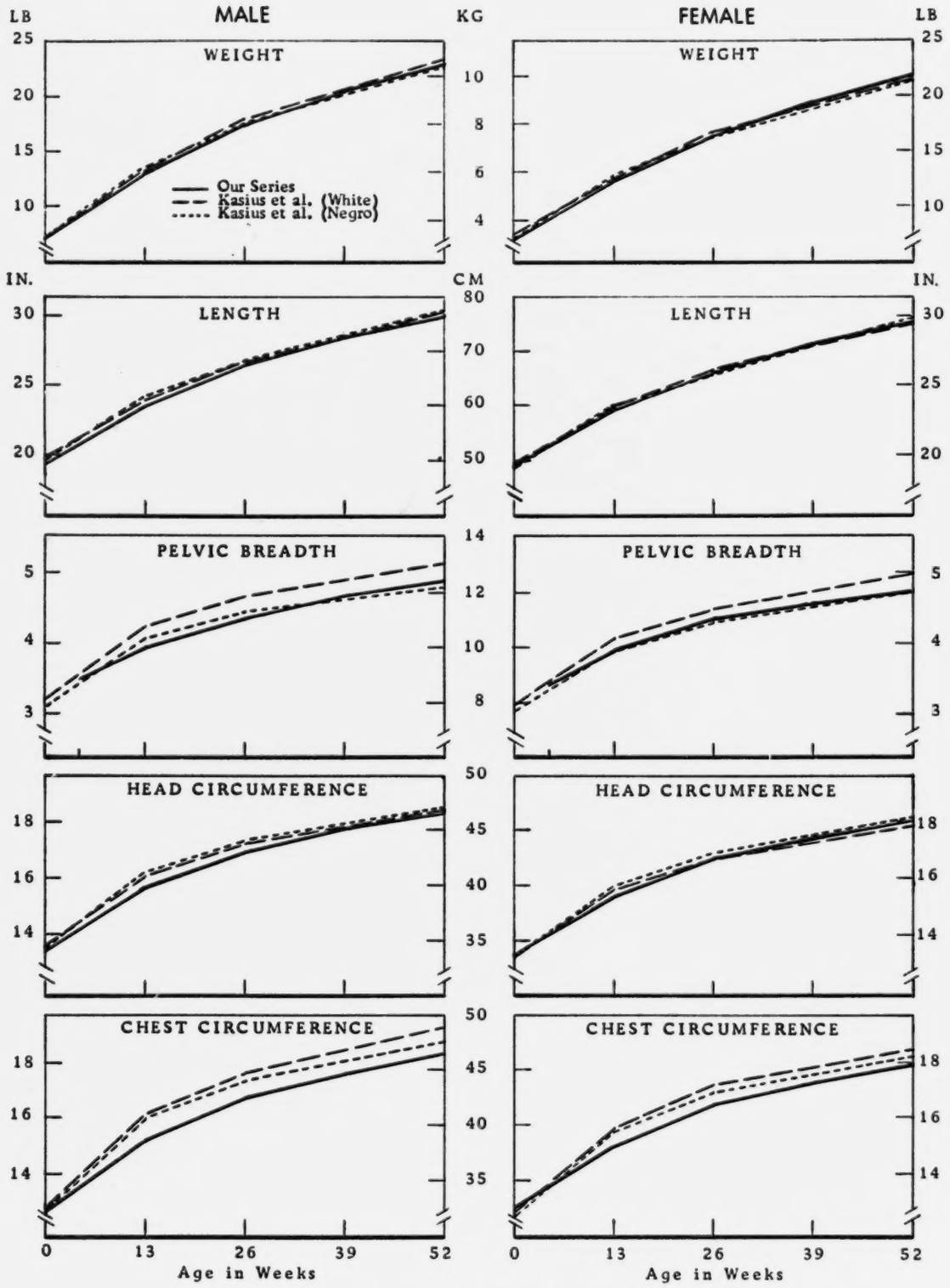

FIG. 4. Comparison of means at quarterly intervals in the present series with those for white and Negro infants of the Philadelphia sample.[2]

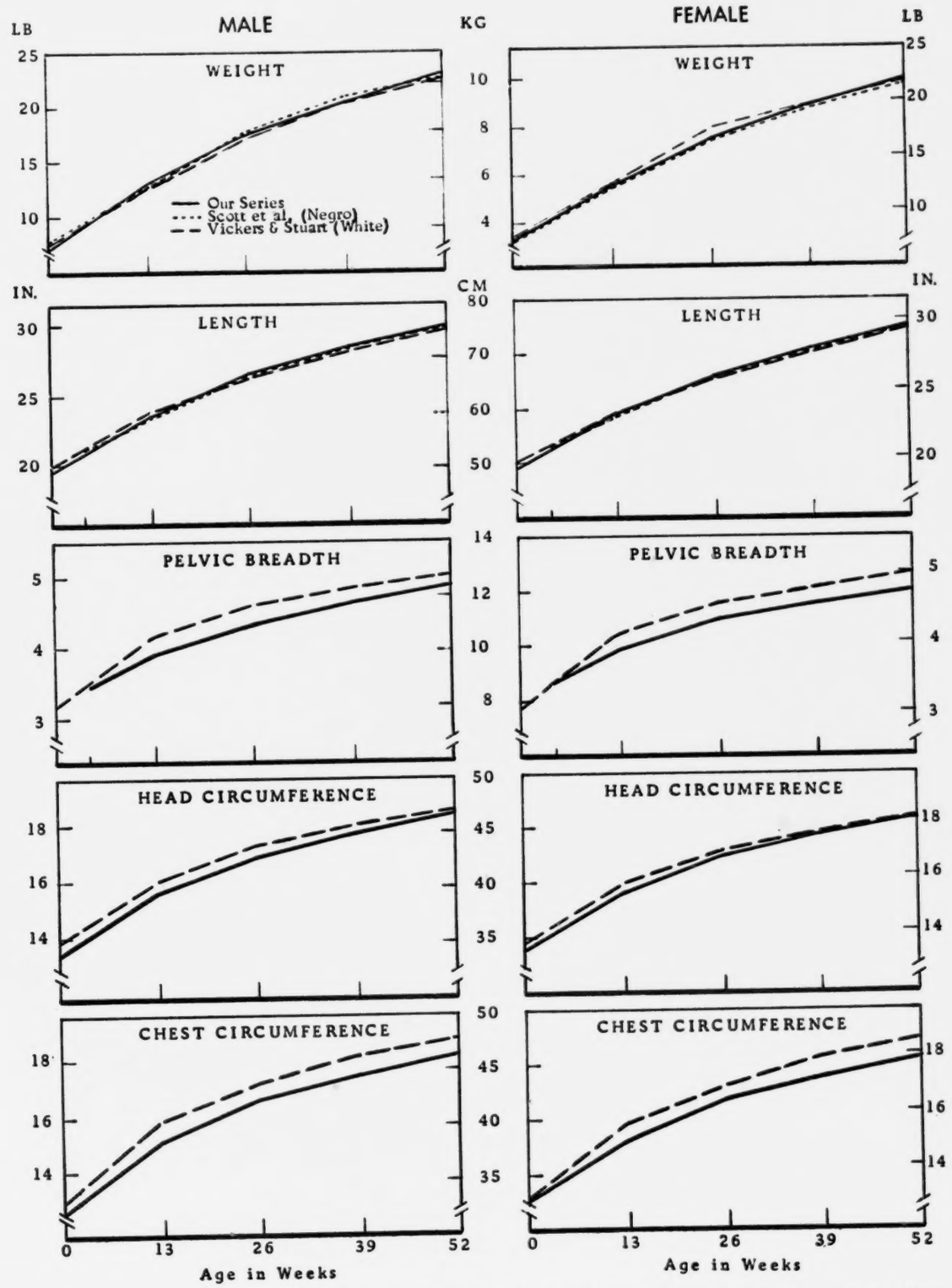

FIG. 5. Comparison of the means at quarterly intervals in the present series with those of the Washington sample (Negro)[7] and those of the Boston sample (white).[8]

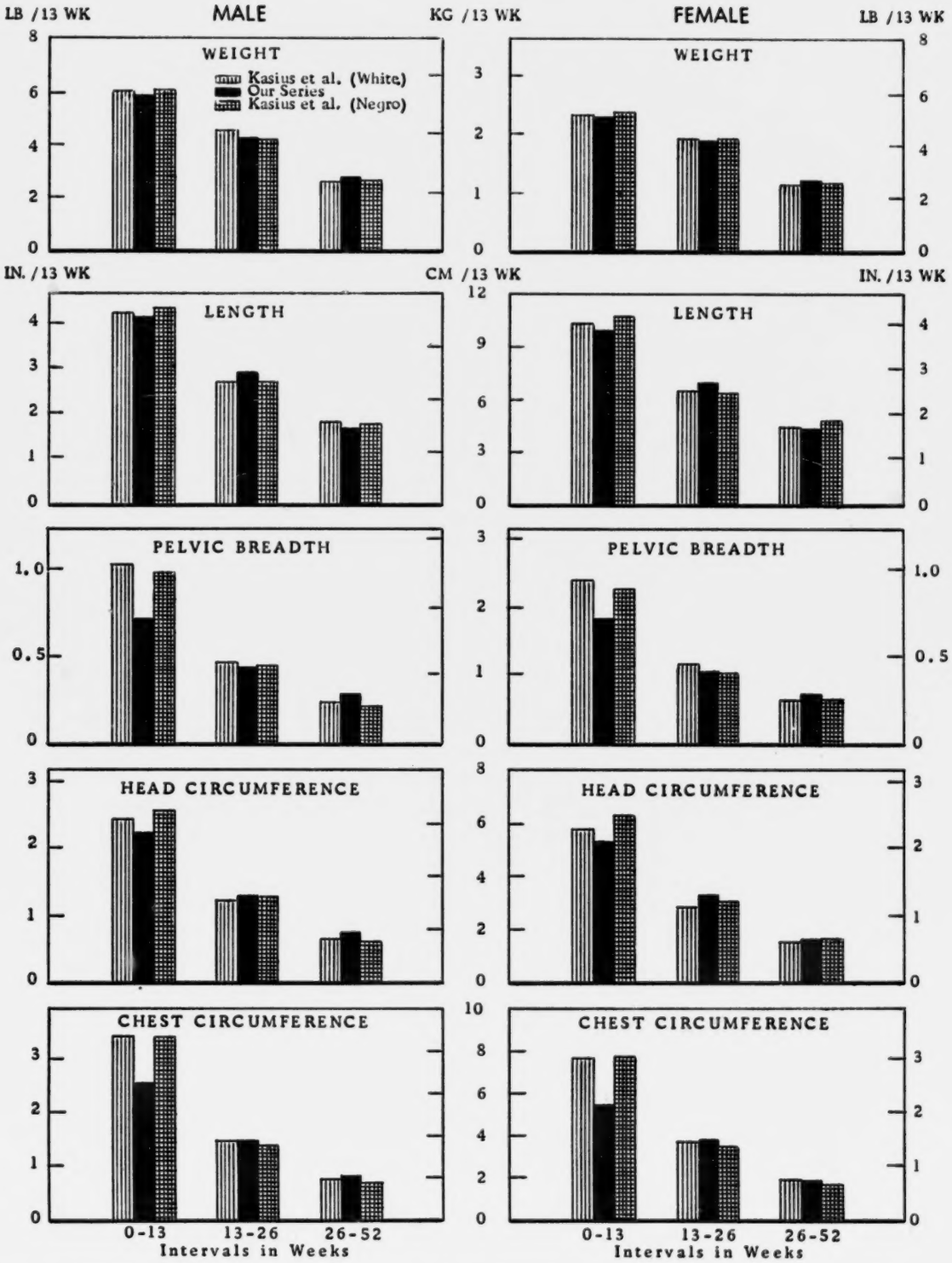

FIG. 6. Comparison of mean growth velocities for the present series with those for the white and Negro infants of the Philadelphia sample.[2]

TABLE IX

GROWTH VELOCITIES FOR WHITE AND NEGRO INFANTS IN PHILADELPHIA STUDY IN 1947–1952[2]

White Infants				*Interval (mo)*	*Negro Infants*			
Male		*Female*			*Male*		*Female*	
N	*Mean*	*N*	*Mean*		*N*	*Mean*	*N*	*Mean*
Weight, lb/3 mo					*Weight, lb/3 mo*			
264	6.01	248	5.19	0– 3	151	6.11	130	5.24
212	4.61	204	4.24	3– 6	134	4.24	116	4.01
132	2.65	120	2.56	6–12	91	2.67	84	2.55
238	5.28	212	4.69	0– 6	141	5.17	120	4.62
134	3.89	122	3.62	0–12	92	3.84	84	3.37
Length, cm/3 mo					*Length, cm/3 mo*			
243	10.80	207	10.30	0– 3	132	11.08	114	10.73
209	6.89	203	6.42	3– 6	132	6.89	114	6.28
127	4.51	122	4.44	6–12	87	4.56	81	4.79
217	8.80	173	8.33	0– 6	124	8.95	106	8.42
124	6.68	103	6.34	0–12	81	6.66	73	6.29
Pelvic Breadth, cm/3 mo					*Pelvic Breadth, cm/3 mo*			
190	2.61	167	2.38	0– 3	106	2.49	94	2.24
180	1.18	157	1.15	3– 6	110	1.12	95	1.04
113	0.59	97	0.62	6–12	70	0.53	67	0.63
172	1.86	136	1.75	0– 6	98	1.78	87	1.63
98	1.27	80	1.18	0–12	61	1.15	58	1.07
Head Circumference, cm/3 mo					*Head Circumference, cm/3 mo*			
240	6.20	208	5.83	0– 3	131	6.48	113	6.28
209	3.13	203	2.92	3– 6	132	3.25	114	3.09
127	1.62	122	1.57	6–12	88	1.54	81	1.65
215	4.65	174	4.30	0– 6	123	4.91	105	4.70
122	3.17	103	2.94	0–12	81	3.21	72	3.12
Chest Circumference, cm/3 mo					*Chest Circumference, cm/3 mo*			
241	8.74	208	7.71	0– 3	131	8.71	113	7.74
207	3.76	202	3.68	3– 6	131	3.52	111	3.49
126	1.92	119	1.81	6–12	87	1.71	81	1.65
215	6.19	174	5.71	0– 6	122	6.09	103	5.58
121	4.12	100	3.76	0–12	80	3.88	72	3.61

As would be expected, the males of both races measured larger than the females at all study ages. The growth curves of all five samples are quite similar in this dimension (Figs. 4 and 5).

The annual velocity of growth was greater for the males than the females of both races. The highest annual velocities for both sexes were those of the Philadelphia Negro sample. Our sample showed the lowest annual velocity for males, while the white sample showed the lowest for females. In general, the differences were greater by sex than by race, and all were very small. The first-quarter comparison (Fig. 6) showed the velocities in our sample to be the lowest and those for the Philadelphia Negro sample to be the highest for both sexes. During the second quarter the velocities for males were about equal for all three samples, with the white sample lagging slightly; but the females in our sample grew faster and the white females grew slower than those of the other Negro sample. During the second half year, all velocities for females were practically equal, while the highest velocity for males was found in our sample.

For all three samples growth decelerated more rapidly in the males than in the females For both sexes deceleration was most rapid in the Philadelphia Negro sample and

TABLE X

PERCENTAGE GAINS FOR WHITE AND NEGRO INFANTS IN PHILADELPHIA STUDY IN 1947–1952[2]

White Infants				*Interval (mo)*	*Negro Infants*			
Male		*Female*			*Male*		*Female*	
N	*Mean*	*N*	*Mean*		*N*	*Mean*	*N*	*Mean*
Weight					*Weight*			
265	80.4	247	72.0	0– 3	151	83.7	130	74.4
212	33.6	204	33.8	3– 6	134	31.3	116	32.4
133	29.5	120	30.1	6–12	91	30.4	84	31.1
238	141.8	212	129.4	0– 6	141	142.4	120	130.9
134	215.0	122	204.2	0–12	92	212.3	84	201.6
Length					*Length*			
244	21.6	206	20.7	0– 3	132	22.2	114	21.7
209	11.2	203	10.7	3– 6	132	11.3	114	10.3
127	13.3	122	13.3	6–12	87	13.3	81	14.5
218	35.0	173	33.5	0– 6	124	35.9	106	34.2
125	53.0	103	51.6	0–12	81	53.6	73	53.5

least rapid in ours, showing no consistent difference by race.

Chest Circumference

The birth measurements were greater for males than for females in all samples except ours. Again, we attribute this exception to sampling bias. At all other comparison ages, our sample showed smaller mean chest circumferences for both sexes than any of the three comparison samples. In general, the chest circumferences were smaller in both Negro samples than in the Philadelphia white sample, but the circumferences of Boston white males were slightly below those of the Philadelphia Negro males at 3 and 6 months of age. At 6 months the circumferences of Boston white females were slightly below those of the Philadelphia Negro females.

The annual growth velocity was higher for males than for females in both races, and higher for the white than for either Negro sample. The annual velocities in our group

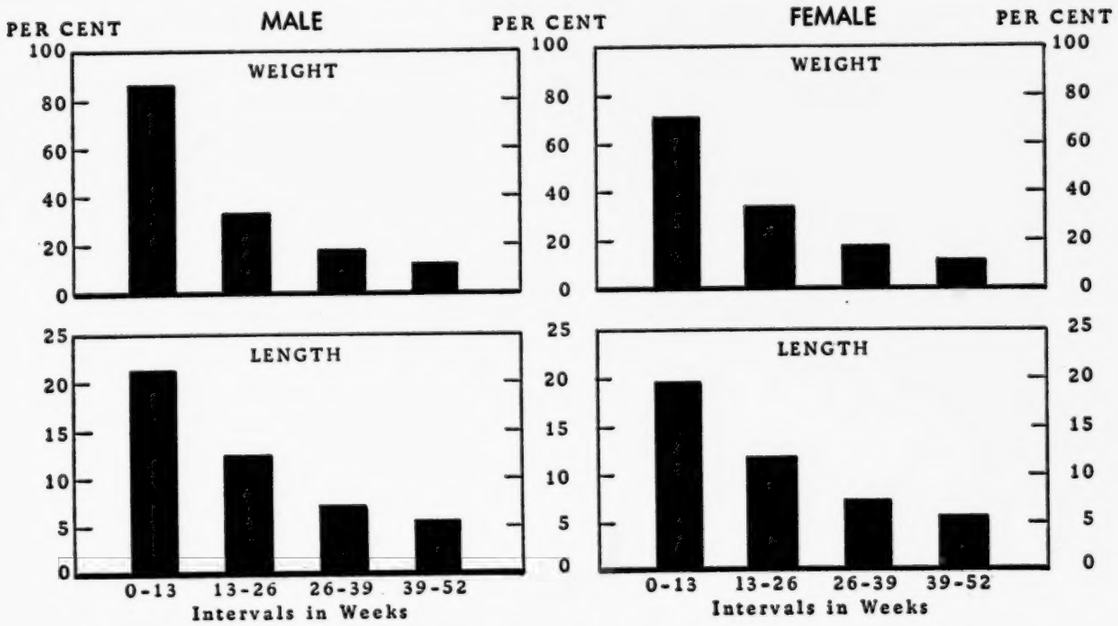

FIG. 7. Quarterly percentage gains in weight and length for infants in the present series.

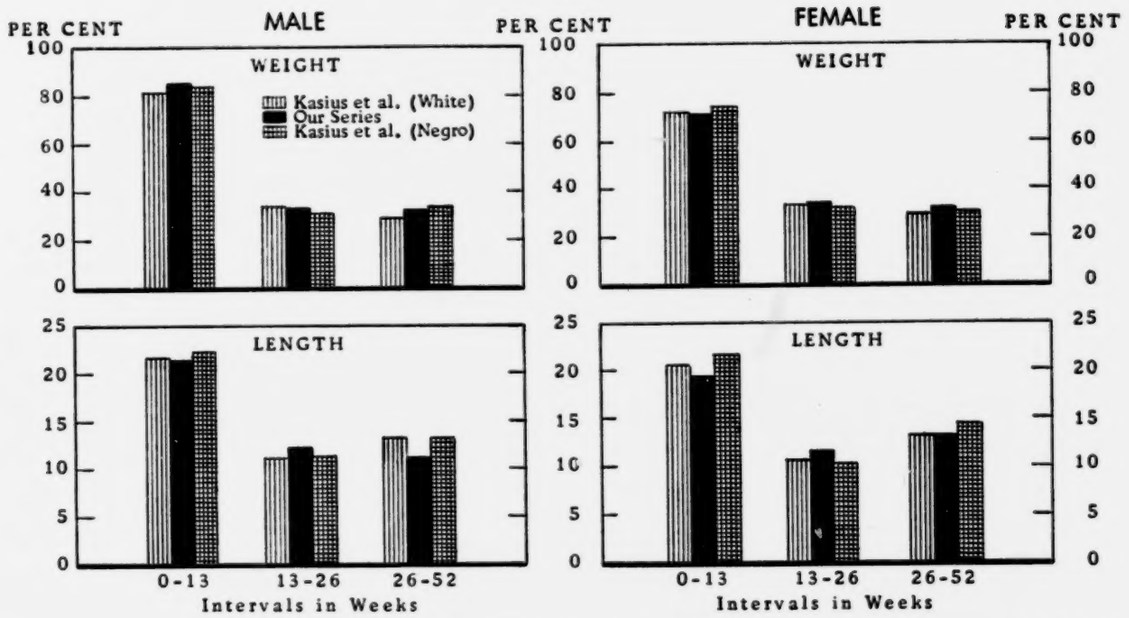

FIG. 8. Comparison of percentage gains in weight and length for the present series and the Philadelphia sample.[3]

were the lowest among the three samples for both sexes. Figure 6 shows that this is due primarily to the obvious difference during the first quarter. We can offer no explanation for this finding. In the two later comparison periods there were only very small differences between the three samples.

For both races growth decelerated more rapidly in the males. For both sexes deceleration was most rapid in the Philadelphia Negro sample and least rapid in ours, showing no consistent racial difference.

SUMMARY

We have presented size and growth velocity data for weight, length, pelvic breadth, and head and chest circumference during the first year of life in Negro infants observed in a well-baby clinic. The subjects were normal, healthy infants of families in the lower middle economic class. We have compared our data with similar data representing two white and two Negro samples studied by other investigators. In general, pelvic breadth, and head and chest circumference were found to be slightly larger in the white than in the Negro samples. For pelvic breadth and chest circumference, the annual growth velocities were higher in the white than in the Negro samples. Growth in pelvic breadth was found to decelerate more rapidly in the white than in the Negro samples. However, we verified no statistically significant difference by race. In general, the males of both races were larger in all dimensions than the females. The males showed the higher annual growth velocities. Growth was found to decelerate more rapidly in the males than in the females. In general, whenever any two groups were compared, it was found that growth decelerated more rapidly in the one with the higher first-quarter growth velocity. This was true in 42 of 45 comparisons.

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